MONTANA DEPARTMENT OF ENVIROMENTAL QUALITY
Permitting and Compliance Division
Water Protection Bureau
P.O. Box 200901
Helena, Montana 59620-0901

Permit Fact Sheet
Montana Ground Water Pollution Control System (MGWPCS)

Permittee:	Glacier Point Homeowners & Water Users Association Inc. P.O. Box 7045 Helena, MT 59604
Permit No.:	MTX000178
Facility Name:	Glacier Point Major Subdivision
Facility Location:	East of the intersection of North Montana Avenue and Forestvale Road, Southwest ¼, Section 5, Township 10 North, Range 3 West in Lewis and Clark County
Facility Contact:	Faron Henderson, P.E. DBEC, Inc. 1617 Euclid Avenue, Suite #5 Helena, MT 59601 Phone: (406)449-7299
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Outfall(s)/Type:	001 – Subsurface Drainfield

I. PERMIT STATUS

This statement of basis is for the issuance of a new wastewater discharge permit for Glacier Point Major Subdivision (GPMS) which is owned by Glacier Point Homeowners & Water Users Association Inc. pursuant to the Montana Ground Water Pollution Control System (MGWPCS). Glacier Point Homeowners & Water Users Association Inc., the permittee submitted a permit application that was received on April 18, 2006. The application was determined to be deficient on June 27, 2006. A revised GW-1 application was received on October 10, 2006. On October 12, 2006, requested ground water quality analytical data was received. This application was determined to be complete on October 13, 2006. This is a new source and is therefore subject to the Montana Nondegradation Policy (75-5-303, MCA) and administrative rules (ARM 17.30.701, et seq.).

The Public Water Supply Division has reviewed and approved (December 23, 2005) two supply wells for GPMS under EQ#06-2056. This proposed subdivision is also subject to the review and approval under

the Montana Sanitation in Subdivision Act. A Certificate of Subdivision Plat Approval is pending (EQ#07-1170).

II. FACILITY INFORMATION

A. General

The GPMS will consist of 84 single-family lots and 1 industrial/business lot described as a self-storage facility with an office. The subdivision will be located in the Helena Valley, west of Interstate 15 on the south side of Forestvale Road.

This 24.9 acre-development is situated on an almost rectangular piece of property with the long axis in the north-south direction. Individual residential lots are located on the west half of the development. The east half of the property from north to south will contain the subsurface drainfield and replacement areas, the self-storage units, and the two public supply wells that will provide water to the subdivision.

B. Wastewater Collection, Treatment, and Disposal

Each lot will have an individual septic tank to remove floatable and settleable solids in the raw sewage and provide primary treatment. Each lot will also have an individual Eliminite treatment system. Eliminite systems use a natural biological process to remove nutrients in the wastewater (particularly nitrogen), much the same as a recirculating trickling filter. The Eliminite system has been reviewed by the Department (DEQ, 2004) and has been determined to provide Level II wastewater treatment with the following caveats,

1. An approved system is required to use 1 ½ -inch natural rock or the medialite media,
2. The applicability for biologically mediated nutrient reduction systems may not be suitable for seasonal and/or commercial-type activities.
3. Each Eliminite system is required to be dosed or pressure-dosed from the individual dose tank to the collection system or final discharge location.
4. Approval is valid for residential and non-residential facilities, with no limit on design flows as long as other applicable laws, rules and design circulars are met.

The GPMS's proposed wastewater treatment system meets the above specifications.

From the individual Eliminite systems (see Attachment 1), the effluent is dosed to a community wastewater collection system that routes the effluent from each lot to a dosing chamber (680 gallons per dose, 6,242 gallon capacity). A McCrometer Ultra Mag totalizing flow meter will measure the total discharge from the dosing chamber. Effluent is pressure-dosed to the 52,178 ft^2 subsurface drainfield, which discharges to the ground water. The subsurface drainfield replacement areas are located to the north (37,647 ft^2) and to the south (40,147 ft^2) of the primary drainfield.

The design capacity for the GPMS wastewater treatment system is 25,250 gallons per day (gpd) (DBEC, 9/11/2006).

III. DESCRIPTION OF THE DISCHARGE

A. Outfall Location

The proposed permit authorizes the permittee to discharge residential strength wastewater from individual-lot Eliminite treatment systems to a subsurface drainfield.

- Outfall 001 is located in the northeast corner of the GPMS at 46° 39' 9.33" North latitude and 112° 00' 46.22" West longitude.

B. Past Monitoring Data/Effluent Characteristics

1. Past Monitoring Data

This is a proposed site and the permittee has collected no wastewater samples for analysis.

2. Effluent Characteristics

Based on the average performance of reported Eliminite Treatment Systems, the effluent that is discharged from a typical Eliminite recirculating trickling filter is expected to have the following average chemical characteristics (Eliminite, 2006):

- Average Total Nitrogen (TN) = 7.3 to 17.7 mg/L
- Average Biological Oxygen Demand (BOD) = 25.7 to 65.9 mg/L

In addition, a USEPA Fact Sheet, TFS-9 (2002), entitled "Fixed-Film Processes (particularly trickling filters)" states that effluent that is discharged from a typical tricking filter to a drainfield is expected to have the following average chemical characteristics:

- Total Suspended Solids (TSS) are 5 to 40 mg/L
- BOD is 5 to 40 mg/L
- Bacteria (E-coli) reduced 10^1 to 10^3 organisms (USEPS, 2002)
- Nitrogen removal varies from 65 to 75% according to TSF-51; Table 1 Nitrogen concentrations from 10 to 50 mg/L (USEPA (2002)
- Phosphorous removal ranges from 10 to 15 percent (USEPA, 2002); Phosphorous concentration is 10.6 mg/L (DEQ, 1977)

The Department has established that a properly designed, installed, operated and maintained Eliminite trickling filter system meets the definition of Level II treatment (DEQ, 2004). According to ARM 17.30.702(11), Level II treatment means, the wastewater treatment system removes at least 60% of the total nitrogen (TN) as measured from the raw sewage load to the system, or the system discharges a TN effluent concentration of 24 mg/L or less.

IV. SITE CHARACTERISTICS

A. Soils

Soils in the area are from the Nippt-Attewan-Beaverell Complex. They are composed of 55% Nippt, 20% Attewan, and 15% Beaverell, with other unclassified minor components. The Nippt and the Beaverell are a gravelly loam with moderate to rapid permeability (increasing with depth). The Attewan is a loam and permeabilities are very rapid with increasing depth to 5 feet below ground surface (bgs). These soils have a very limited filtering capacity.

Onsite soils in the area of the proposed drainfield and replacement areas were described by the county sanitarian (Preskar, R.S., 2005) as cobbly to extremely cobbly with increasing depth to 8.3 feet bgs.

B. Geology

GPMS is located in the Helena Valley, which is an intermontane basin bounded by folded and fractured sedimentary, metamorphic, and igneous rocks of Precambrian to Cretaceous age. The valley-fill (approximately 6,000 feet) is primarily composed of a thick section of fine-grained Tertiary lacustrine ash and volcaniclastic sediments with localized lenses of gravel. Unconformably overlying these deposits is a thinner section of locally derived fine-to-coarse-grained Tertiary sediments that grade into Quaternary alluvium in the upper 100 feet of the valley fill (Briar, 1992).

C. Hydrogeology

The upper 100 feet of the valley-fill material is best described as, “a sequence of complexly stratified lenses of cobbles, gravel, and sand” with 30 to 70 percent of the section composed of intercalcated silt and clay. “Lateral discontinuity of the many fine-grained layers allows hydraulic interconnection of the coarse-grained water-yielding zones, which therefore function as one complex aquifer system” (USGS, 1992). The subsurface drainfield for GPMS will be constructed in the near-surface portion of this Quaternary valley-fill material.

Three shallow ground water monitoring wells were drilled onsite in August 2006. The locations of these monitoring wells triangulate the northeast corner of the GPMS property where the subsurface drainfield is proposed. The “west” well (100 feet west of the northeast corner of the property) and the “south” well (325 feet southeast of the northeast property corner, along the east property boundary) were drilled to a total depth of 40 feet and completed as open-bottom wells. The “pumping” well (in the northeast corner) was drilled to a total depth of 80 feet bgs.

Sand and large gravel was described from 4 to 10 feet below ground surface (bgs) in all three monitoring wells. From10 to 30 feet, clay and gravel was observed in all three wells. Sand was identified in the “south” well from 30 to 40 feet. After the ground water in the wells had equilibrated, SWLs were measured on September 5, 2006. The SWL was 13.099 feet bgs in the “west” well and 13.711 feet bgs in the “south” well.

In the “pumping” well, sand and gravel with seams of clay were described from 40 to 80 feet. Shallow ground water was encountered at 40 feet. The well was perforated from 40 to 60 feet. The SWL was measured at 14.300 feet bgs. In general, in this portion of the Helena Valley, SWLs will fluccuate

seasonally in response to local irrigation practices and infiltration/recharge from streamflow. No significant temporal or seasonal variabilities have been observed in the ground water quality in this area.

D. Hydrology

On September 6, 2006, a 21-hour pump test was conducted on the "pumping" well. The pumping rate was 275 gallons per minute (gpm). Based on the results of this test, the transmissivity from the time-drawdown analysis is 32,267 gpd/ft (4,314 ft^2/day). Using an aquifer thickness (i.e., perforations) of 20 feet, the calculated hydraulic conductivity is 216 ft/day.

The permittee submitted a hydraulic gradient of 0.0054 ft/ft with the ground water flow in a N10°E direction, as calculated from ground water level elevations measured on September 5, 2006, in the above three monitoring wells.

The nearest downgradient surface water from Outfall 001 is the ski ponds located 3,600 feet to the east of the proposed drainfield area and will be used in the phosphorous breakthrough analysis. Ten Mile Creek is located approximately 1,200 feet southeast of the property and is a losing stream in this area.

V. RECEIVING WATER

A. Water-Use Classification and Applicable Water Quality Standards

A ground water sample was collected from the "west" well on September 5, 2006. Laboratory analyses measured the nitrate plus nitrite (as N) concentration at less than 0.05 mg/L (i.e., non-detect) and the specific conductivity at 413 µmhos/cm. Nitrate plus nitrite (as N) concentrations in samples collected on October 3, 2006 from the "pumping" well and the "south" well were both less than 0.05 mg/L (non-detect).

Based on the above specific conductivity value (413 µmhos/cm), the receiving water for Outfall 001 is Class I ground water. Class I ground water has a specific conductivity of less than or equal to 1,000 µmhos/cm at 25 degrees Centigrade, as defined by ARM 17.30.1006(1). According to ARM 17.30.1006(1)(a), the quality of Class I ground water must be maintained so that these waters are suitable for public and private water supplies, culinary and food processing, irrigation, commercial and industrial purposes, drinking water for livestock and wildlife, with little or no treatment. Human health standards listed in DEQ Circular 7 (February 2006) apply to concentrations of dissolved substances in Class I ground water.

The applicable ground water quality standards and nondegradation significance criteria are included in Table 1.

Table 1. Applicable Water Quality Standards and Nondegradation Significance Criteria

Parameter	DEQ Circular 7 Human Health Ground Water Standards	Nondegradation Significance Criteria in Ground Water for Level II Treatment
Nitrate (as N)	10 mg/L	7.5 mg/L
Total Phosphorus	no standard	50 year breakthrough [(1)], mg/L
E-Coli Bacteria	<1 organism per 100 ml	<1 organism per 100 ml

[1] The phosphorus significance criteria is listed in ARM 17.30.715(1)(e): "changes in concentration of total inorganic phosphorus in ground water if water quality protection practices approved by the department have been fully implemented and if an evaluation of the phosphorus adsorptive capacity of the soils in the area of the activity indicates that phosphorus will be removed for a period of 50 years prior to a discharge to any surface waters."

VI. MIXING ZONE

The permittee has proposed to discharge all wastewater from Outfall 001 and has requested a source specific ground water mixing zone of 170 feet (ARM 17.30.518) for Outfall 001. The permittee must comply with the ground water mixing zone rules pursuant to ARM Title 17, Chapter 30, Subchapter 5. Ground water standards may be exceeded within the mixing zone, provided all existing and future beneficial uses of the state waters are protected (ARM 17.30.1005). The shape of the mixing zone is determined using the drainfield dimensions and information on water table elevations and topography.

The source specific 170-foot mixing zone will be measured from the midpoint of the proposed subsurface drainfield in a N10°E direction to the north and east property boundaries of the subdivision. The boundaries of the ground water mixing zone shall not go beyond the property boundaries of the subdivision.

The shallow ground water flow direction is $N10^0E$ and the hydraulic gradient is 0.0054 ft/ft (see Part IV.D., above).

The width of the drainfield, perpendicular to the direction of ground water flow is approximately 432 feet. A source specific 170-foot ground water mixing zone will be granted for an individual parameter of nitrate (as N) [ARM 17.30.505(1)(a)].

Sample analysis from all three onsite shallow ground water monitoring wells measured less than 0.05 mg/L. Therefore, 0.05 mg/L will be used as the background value. The permittee will be required to comply with the applicable ground water quality standards at the boundaries of the mixing zone [ARM 17.30.508(1)(a), ARM 17.30.1006(1)(b), DEQ Circular 7]. The concentration of pollutants has been estimated based on a mass balance calculation at the downgradient boundary of the source specific 170-foot ground water mixing zone.

VII. PROPOSED EFFLUENT LIMITS

Data show Eliminite wastewater treatment systems produce a high quality effluent, and are considered to be a Level II treatment. Level II wastewater treatment systems must provide a higher degree of treatment than a conventional wastewater treatment system. A Level II system must provide at least a 60 percent removal of total nitrogen (TN) in the raw wastewater or an effluent TN concentration of 24 mg/L or less

beneath the drainfield [ARM 17.30.702(11)]. The Department has established that a properly installed, operated and maintained Eliminite wastewater treatment system meets the definition of a Level II system.

The permit limit for TN will be set at 26 mg/L in the effluent, prior to discharge to the drainfield because an additional 7% of nitrogen removal is assumed to occur within the drainfield providing a final TN concentration discharged to ground water of 24 mg/L. Based on the performance of the system, the technology-based effluent limits (TBELs) for TN and total phosphorous (TP) are set forth in Table 2.

Table 2. Technology-Based Effluent Limits for Outfall 001 (at the dose tank prior to discharge to the subsurface drainfields)

Parameter	**Daily Maximum(1) Concentration (mg/L)**
Total Nitrogen, as N (TN)	26
Total Phosphorous, as P (TP)	NA

(1) See definitions, Part V. of the permit.
NA = Not Applicable

The peak flow (daily or instantaneous) of 25,250 gpd is based on the sizing of the hydraulic components for the design of the wastewater facility, such as pumps, piping, storage and absorption systems (DEQ Circular 4, 2004).

VIII. PROPOSED WATER QUALITY-BASED EFFLUENT LIMITS

The Montana Water Quality Act requires that a discharge to state waters shall not cause a violation of a water quality standard outside a Department authorized mixing zone. Ground water quality standards apply at the hydraulically downgradient mixing zone boundary in the unconfined aquifer. Water quality limitations must be established in permits to control all pollutants or pollutant parameters that are or may be discharged at a level which will cause, have reasonable potential to cause or contribute to an excursion above any state water quality standard. The permittee must comply with Montana Numeric Water Quality Standards included in DEQ Circular 7 (February 2006) and the protection of beneficial uses (ARM 17.30.1006). Ground water quality standards may be exceeded within a Department authorized mixing zone, provided that all existing and future beneficial uses of the state waters are protected (ARM 17.30.1005).

A. Nitrate

The proposed wastewater system constitutes a new source [ARM 17.30.702 (18)(a)]. The Class I ground water is considered high quality water and is subject to Montana's Nondegradation Policy (75-5-303, MCA). The applicable ground water standard is based on nondegradation, with a nitrate concentration limit of 7.5 mg/L [ARM 17.30.715 (1)(d)(iii)] at the end of the source specific 170-foot ground water mixing zone.

The total nitrogen (TN) concentration is the sum of nitrate plus nitrite, as nitrogen (N) plus total Kjeldahl Nitrogen (as N). The Department assumes all the nitrogen discharged to the drainfield in the effluent is converted to nitrate, as (N).

The allowable discharge concentration is derived from the mass balance water quality equation which considers dilution and background concentration of the receiving water (EPA, 2000).

$$C_2 = \frac{C_3(Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C_2 = 25.33 mg/L

C_1 = average ambient ground water concentration is 0.05 mg/L
C_2 = allowable discharge concentration (TN) beneath the drainfield
C_3 = ground water concentration limit for pollutant (from DEQ Circular 7 or other appropriate water quality standard) at the end of the mixing zone is 7.5 mg/L, instantaneous (no single sample shall exceed)
Q_1 = ground water volume is 8,078.78 ft^3 / day
Q_2 = maximum flow of discharge (design capacity of system is 3,375.67 ft^3 / day)

The volume of ground water that will mix with the discharge (Q_1) is estimated using Darcy's equation: Q_1 = K I A. The calculated value of Q_1 is 8,078.78 ft^3/day for the mixing zone; assuming an aquifer K value of 216 ft/day (21-hour pump test), a calculated hydraulic gradient of 0.0054 ft/ft (calculated from 3 onsite monitoring wells), and a cross sectional area of flow at the downgradient boundary of the source specific 170-foot mixing zone of 6,926.25 ft^2.

The design capacity of the wastewater disposal system is 25,250 gpd, or 3,375.67 ft^3/day. The nitrate (as N) concentration must not exceed 7.5 mg/L at the end of the mixing zone. The average ambient concentration of nitrate-nitrogen in the alluvial ground water is less than 0.05 mg/l (C_1) [, "west" well 9/5/06. It is assumed that the entire TN load in the effluent converts to nitrate (as N) and enters the ground water.

The projected maximum concentration of TN in the effluent discharged to ground water must not exceed 27.1 mg/L at Outfall 001. This effluent limit ensures the nitrate (as N) concentration at the end of the ground water mixing zone is at or below the nondegradation significance criterion of 7.5 mg/L. As discussed in Part VII, nitrate reduction of approximately 7 percent is assumed to occur beneath the drainfield. Therefore, to discharge a TN concentration of 25.33 mg/L below the drainfield, the effluent limit from the individual Eliminite systems at the community dosing chamber prior to discharge to the subsurface drainfield is calculated at 27.1 mg/L of TN.

25.33 mg/L (.07) = 1.77 mg/L	Assumed nitrate reduction beneath the drainfield.
25.33 mg/L + 1.77 mg/L = 27.1 mg/L	Maximum concentration of TN at the dose tank, prior to discharge to the subsurface drainfield (Outfall 001).

The calculated effluent concentration of TN must not exceed 27.1 mg/L at the design flow in order to maintain a concentration that is less than the state water quality standard of 7.5 mg/L for nitrate (as N) in the ground water at the mixing zone (Part VI) boundary. The WQBEL will be expressed as load (lbs/day) based on the design flow of the system (25,250 gpd) and the calculated maximum concentration, as follows:

Load limit (lbs/day) per outfall = effluent flow rate (gpd) ***x*** *daily maximum concentration (mg/L)* ***x*** *8.34 x* 10^{-6}

Load limit (lbs/day) per outfall = (25,250 gpd) **x** (27.1 mg/L) **x** (8.34 x 10^{-6})

Load limit (lbs/day) per outfall = 5.71 lbs/day

The proposed WQBELs are summarized in Table 3.

B. Phosphorus

Phosphorus is removed mainly through soil sorption processes, which are slow and vary based on soil composition. The total phosphorus (TP) limitations are imposed to ensure that the quality of the effluent meets the nondegradation limit prior to discharge into any surface water [ARM 17.30.715(1)(e)]. The effluent limits do not include a concentration limit for phosphorus because of the method used to determine compliance with the 50-year breakthrough criteria. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the phosphorus between the discharge point and the surface water and the average load of phosphorus from the wastewater source. Total phosphorus of 10.6 mg/L is consistent with the concentration found in residential wastewater. The estimated load from this facility is approximately 2.23 pounds per day (lbs/day). The adsorption capacity of the soil is based on the total load of phosphorus, it is not concentration dependent.

The nearest downgradient receiving surface water is the ski ponds. These recreational ponds are located approximately 3,600 feet east (general hydraulically downgradient direction) from the proposed drainfield area. A phosphorous breakthrough analysis shows the breakthrough time to the surface water is 69.2 years (using 6.44 lbs/yr/lot) and the discharge is considered nonsignificant degradation pursuant to the criteria of ARM 17.30.715(1)(e).

C. E-Coli Bacteria

The department is not granting a mixing zone for E-coli bacteria because a properly sited and operated drainfield should remove most, if not all, of the pathogenic bacterial indicators within 2 to 3 feet of the drainfield's infiltrative surface (USEPA, 2002). The point of compliance is at the edge of the drainfield/outfall. The E-coli water quality standard is <1 organism per 100 ml in the ground water (DEQ Circular 7, 2/06). However, based on the following site-specific criteria, ground water monitoring for E-coli bacteria at the downgradient boundary of the source specific 170-foot mixing zone will be required at this time.

- Onsite soils were described as cobbly to extremely cobbly with increasing depth to 8.3 feet bgs, which indicates rapid permeabilities in the shallow subsoils.

The systematic pressure-dosing of the drainfields will minimize saturated conditions and maximize the die-off rate in the natural sediments. The proposed subsurface drainfields will discharge effluent approximately 2 feet below the ground surface. The depth to ground water at this site ranges from 13 to 14.3 feet bgs. This may provide an adequate soil-subsoil column where treatment may occur naturally in the unsaturated zone.

In the event of an E-coli bacteria concentration detected above the water quality standard (less than 1 organism per 100 ml) in the ground water monitoring well at the end of the source specific mixing zone, the exceedance shall be verified by re-sampling the well within 72 hours from the laboratory notification of the analytical results from the scheduled sampling event. A validated E-coli exceedance will require the installation of a ground water monitoring well that shall be located at the hydraulically downgradient edge of the drainfield (see Part X. Monitoring Requirements, D. Corrective Action – Ground Water Compliance Limits).

D. BOD5 and TSS

BOD_5 and TSS are monitored in a wastewater treatment system to ensure the efficiency and effective removal of biological material and that the proper aerobic biological processes are being maintained. There are no numeric ground water quality standards for BOD and TSS. However, according to ARM 17.30.1006(1)(b)(ii) the beneficial uses for a Class I ground water must be maintained. BOD and TSS are not subject to nondegradation unless they have a reasonable potential to affect an existing or future beneficial use based on the significance criteria for BOD and TSS, which are narrative [ARM 17.30.715 (1)(g) and DEQ Circular 7].

The proposed WQBELs are listed in Table 3.

Table 3. Water Quality-Based Effluent Limits for Outfall 001 (at the dose tank prior to discharge to the subsurface drainfields)

Parameter	Daily Maximum(1) Concentration (mg/L)	90-Day Average Load(1) (pounds per day)
Total Nitrogen, as N [TN]	27.1	5.71
Total Phosphorus, as P [TP]	NA	2.23

(1) See definitions, Part V of the permit
NA Not Applicable

IX. PROPOSED FINAL EFFLUENT LIMITS

The proposed effluent limitations for Outfall 001 are summarized in Table 4 and are based on the more restrictive of the technology, water quality and nondegradation significance water quality criteria discussed in previous sections. The final proposed effluent limit for TN is water quality-based, relating to the expected performance of the Eliminite system and the subsurface drainfields with proper operation and maintenance. The load limit is proposed based on the design capacity and the WQBEL concentration. The concentration limit is proposed to ensure the system operates at the Level II requirement with an effluent concentration of TN at Outfall 001, not to exceed 24 mg/L, as specified in ARM 17.30.702(11).

The load limit for TN is based on the nondegradation criteria of 7.5 mg/L for nitrate (as N) in ground water. The concentration limit is based on ARM 17.30.715(1)(d)(iii) for level II treatment.

The effluent limit for TP is water quality-based as determined according to nondegradation significance criteria. The water quality-based effluent load limit considers the assimilative capacity of the soil system to estimate the maximum load of phosphorus discharged to the ground water without exceeding the 50-year breakthrough. The 90-day average load limit will provide protection for the surface and ground water.

Table 4. Numeric Effluent Limits for Outfall 001 (at the dose tank)

Parameter	Daily Maximum Concentration [(1)] (mg/L) per Outfall	90-Day Average Load[(1)] (pounds per day) per Outfall
Total Nitrogen, as N (TN)[(2)]	26	5.71
Total Phosphorus, as P (TP)	NA	2.23

(1) See definitions, Part V of the permit.
(2) Total Nitrogen (TN) is the sum of nitrate, nitrite and total kjeldahl nitrogen (as N).
NA Not Applicable

Other Discharge Limitations:

The design maximum daily flow of effluent discharged to Outfall 001 shall not exceed 25,250 gpd.

X. MONITORING REQUIREMENTS

A. Influent Monitoring

No influent monitoring will be required.

B. Effluent Monitoring

Effluent monitoring is essential to ensure the effective treatment and compliance with the effluent limit of Part IX. Samples or measurements shall be representative of the volume and nature of the monitored discharge at the outfall.

The permittee shall monitor the effluent at Outfall 001 for the parameters in Table 5 and at the frequency and with the type of measurement and sampling as indicated. If no discharge occurs during the entire monitoring period, it shall be stated in a Discharge Monitoring Report (DMR) that "no discharge" occurred.

Table 5. Outfall 001 Monitoring Requirements

Parameter, units	Frequency[(1)]	Sample Type[(1)]
Effluent Flow Rate, gpd[(2)]	Continuous	Continuous
Total Suspended Solids (TSS), mg/L	Quarterly	Composite
Biological Oxygen Demand (BOD_5), mg/L	Quarterly	Composite
Total Phosphorus,as P (TP), mg/L	Quarterly	Composite
Nitrate + Nitrite (as N), mg/L	Quarterly	Composite
Ammonia, (as N), mg/L	Quarterly	Composite
Total Kjeldahl Nitrogen (TKN) (as N), mg/L	Quarterly	Composite
Total Nitrogen, as N (TN), mg/L	Quarterly	Calculated[(3)]
Total Nitrogen, as N (TN), lb/da[(4)]	Quarterly	Calculated[(5)]
Total Phosphorus, as P (TP), lb/da[(4)]	Quarterly	Calculated[(5)]

(1) See definitions in Part V of the permit.
(2) To be measured by a recorder or totalizing flow meter.
(3) Total Nitrogen (as N) TN = (nitrate + nitrite, as N) + total Kjeldahl (TKN)

(4) Average daily load calculations: lb/da = concentration (mg/L) x flow (gpd) x 8.34 x 10^{-6}
(5) See definition of "quarterly average" in Part V of this permit.

The permittee shall monitor the flow of the effluent for Outfall 001 prior to entering the subsurface drainfield. The effluent flow measurement method shall be either by recorder or totalizing flow meter; dose counts or pump run-times will not be accepted for new wastewater systems. Flow measurement equipment must have the ability to report a daily maximum flow.

The 24-hour daily flow shall be measured when required composite sampling is conducted. The 24-hour flow measurement must correspond to the sample collection period to calculate an accurate load. The average load for TN and TP for the quarter is the sum of the calculated loads (for each TN and TP composite sample collected within a 24-hour period in the sample quarter) divided by the number of samples collected and analyzed for TN and TP in that sample quarter.

The permittee has stated the method of flow monitoring will be a McCrometer Ultra Mag totalizing flow meter. The McCrometer flow meter will be located after the community dosing chamber, prior to discharging to the subsurface drainfield.

C. Ground Water Monitoring

Ground water monitoring will be required in this permit due to the following site-specific criteria:

- The SWL ranges from 13 to ranges from approximately 13 feet to 14.3 feet
- Soils and subsoils (to 8.3 feet bgs) are cobbly to extremely cobbly (Preskar R.S., 2006), providing rapid permeability in the unsaturated zone and limited filtering capacity.
- The source specific 170-foot ground water mixing zone.
- The Helena Valley aquifer is the primary source of drinking water for the residents of the area.

The permittee is required to monitor the ground water quality at the hydraulically downgradient boundary of the proposed source specific 170-foot ground water mixing zone. The location of the existing "pumping" well meets these requirements and shall be designated as monitoring well, MW1A for Department recordkeeping purposes. Any substitution and/or deviation from this required monitoring well location must be approved by the Department.

The ground water monitoring well (MW1A) will serve as a monitoring point for the source specific 170-foot ground water mixing zone. MW1A will also serve as a detection monitoring well for E-coli bacteria, to ensure natural disinfection is occurring in the unsaturated zone. If E-coli bacteria are detected in MW1A over the water quality standard (as confirmed by a re-sample) a ground water monitoring well will be required to be installed at the hydraulically downgradient (northeast) edge of the subsurface drainfield (see Part VIII. Proposed WQBEL, C. E-Coli Bacteria and Part X. Monitoring Requirements, D.Corrective Action – Ground Water Compliance Limits of this statement of basis)..

MW1A is screened in the first shallow ground water of the Helena Valley aquifer from 40 to 60 feet bgs (total depth is 80 feet).

Ground water monitoring wells must be installed by a licensed monitoring well driller, according to monitoring well construction standards in ARM Title 30, Chapter 21, Subchapter 8. MW1A must be constructed and secured according to ARM 17.50.707. A copy of the completed driller's log was

submitted to the Department on October 2, 2006. The parameters to be monitored and the sampling frequency for the monitoring well are given in Table 6.

Table 6. Ground Water Monitoring Parameters for Monitoring Well MW1A

Parameter, units	Frequency	Sample Type(1)
Static Water Level (SWL) (feet below top of casing)	Quarterly	Measured
E-Coli Bacteria, organisms/100 ml	Quarterly	Grab
Nitrate + Nitrite (as N), mg/L	Quarterly	Grab
Total Kjeldahl Nitrogen (TKN), mg/L	Quarterly	Grab
Total Nitrogen (TN), mg/L	Quarterly	Calculated
Specific Conductivity, µmhos/cm	Quarterly	Grab
Chloride, mg/L	Quarterly	Grab

(1) See definitions in Part V of this permit.

The monitoring of chloride and specific conductance is used as indicators of potential impacts from the wastewater to the ground water.

Ground water sample collection, preservation and analysis shall be conducted according to ARM 17.30.1007 and "Non-Point Source Water Quality Standard Operating Procedures" (4/1/95) at www.deq.mt.gov/wqinfo/monitoring/SOP/pdf/11-10.pdf until the permit is issued.

D. Corrective Action – Ground Water

The trigger values for ground monitoring well MW1A are listed in Table 7. An exceedance of a trigger value for either E-coli bacteria or nitrate + nitrite (as N) will require a resample be collected from the monitoring well within 72 hours of the laboratory notification of the analytical results from the scheduled sampling event. Corrective action will need to be implemented should the analytical results from the re-sample verify the exceedance(s).

Ground water corrective action could involve but not be limited to, one or more of the following measures based on the nature and extent of the potential impacts to the ground water quality.

- Identification of the probable cause and extent of the ground water quality changes.
- Installation and/or monitoring of additional ground water wells, including an upgradient well.
- Increased sampling (frequency and/or constituents).
- Increase the efficiency of the wastewater treatment system.
- Reduce the amount of nutrients or other parameters discharged into the ground water.
- Addition of disinfection to the effluent prior to discharge, if the e-coli bacteria compliance limit is exceeded.
- Supply drinking water to hydraulically downgradient residences.

Table 7. Ground Water Trigger Values for Monitoring Well MW1A

Parameter, units	Trigger Value
E-Coli Bacteria, organisms/100 ml	Less than 1 per 100 ml
Nitrate + Nitrite (as N), mg/L	7.5

XI. Nondegradation Significance Determination

The Department has determined that this discharge constitutes a new or increased source for the purpose of the Montana Nondegradation Policy (75-5-303, MCA; ARM 17.30.702(16)). The applicable water quality standards for Class I ground water are summarized in Table 1. The effluent limits for TN and TP are based on compliance with nondegradation criteria of ARM 17.30.715(1) and 75-5-303, MCA. The proposed discharge will not exceed the water quality standard for nitrate plus nitrite (as N) of 7.5 mg/L at the hydraulically downgradient boundary of the source specific 170-foot ground water mixing zone.

XII. INFORMATION SOURCES

In the development of the effluent limitations, monitoring requirements and special conditions for the draft permit, the following information sources were used to establish the basis of the draft permit and are hereby referenced:

ARM Title 17, Chapter 30, Sub-chapter 5 - Mixing Zones in Surface and Ground Water, September 1999.

ARM Title 17, Chapter 30, Sub-chapter 7 - Nondegradation of Water Quality, March 2000.

ARM Title 17, Chapter 30, Sub-chapter 10 - Montana Ground Water Pollution Control System (MGWPCS), March 2002.

Briar and Madison, "Hydrogeology of the Helena Valley-Fill Aquifer System, West-Central Montana", 1992, U.S.G.S., Water Resources Investigation Report 92-4023.

Cherry, J.A. and Freeze, R. A., *Groundwater*, Prentice-Hall Inc., Englewood Cliffs, NJ., 1979. Chapter 2, pages 26-29.

DBEC, Submittal of supplemental information, received 9/11/06.

DBEC, PWS-5, "Ground Water Under the Direct Influence of Surface Water, 12/2005.

DEQ Circular 4, 2004.

DEQ Circular 7 – Montana Numeric Water Quality Standards, February 2006.

DEQ, Memo-Regensburger, "Revised Modification of Phosphorous Concentration for Domestic Sewage in Nondegradation Reviews," October 29, 1998.

DEQ, Regensburger, "Nutrient-Reducing Wastewater Treatment System Designation Form – Eliminite", August 5, 2004.

DEQ, "Nitrate Sensitivity Analysis Input Data", 1994.

DEQ, "Non-Point Source Water Quality Standard Operating Procedures" (4/1/95) at www.deq.state.mt.us/wqinfo/monitoring/SOP/Sap.asp

DEQ, Regensburger, "Nutrient-Reducing Wastewater Treatment System Designation Form-Eliminite", 8/5/04.

Eliminite, "Product Performance", www.eliminite.com/ 9/2006.

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map Community Panel Number 30027 0315, Effective August 1, 1984.

GWIC Database, http://mbmggwic.mtech.edu

National Small Flows Clearinghouse.

Preskar, R.S., Frank, Onsite Soils Description, 4/8/05.

U.S. Department of Agriculture, Natural Resources Conservation Service, Soils Data, 1/27/03, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

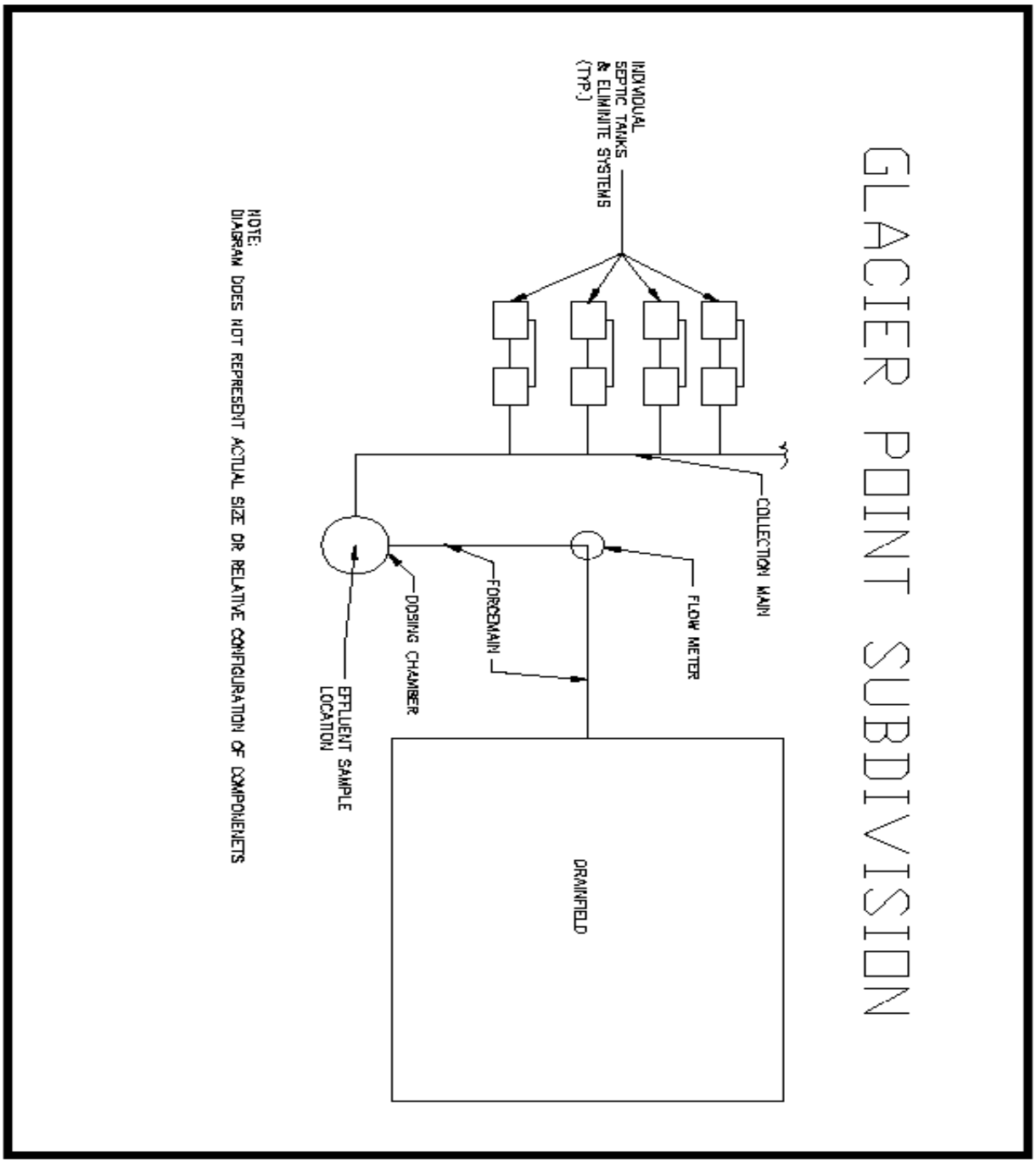
U.S. Environmental Protection Agency, Rev September 2000. U.S. EPA NPDES Permit Writers' Course, Helena, Montana, September, 2000, Workbook EPA 833-B-97-001.

U.S. Environmental Protection Agency, February 2002. *Design Manual: Onsite Wastewater Treatment and Disposal System*. EPA 625/R-00/008, p. 3-29 (Table 3-19) and Fact Sheet TFS-9 "Fixed Film Processes", and Table 1, TFS-51.

XIII. ATTACHMENT

1 – Wastewater Flow Line-Diagram

Prepared by: Pat Potts **Date:** December 5, 2006



ATTACHMENT 1